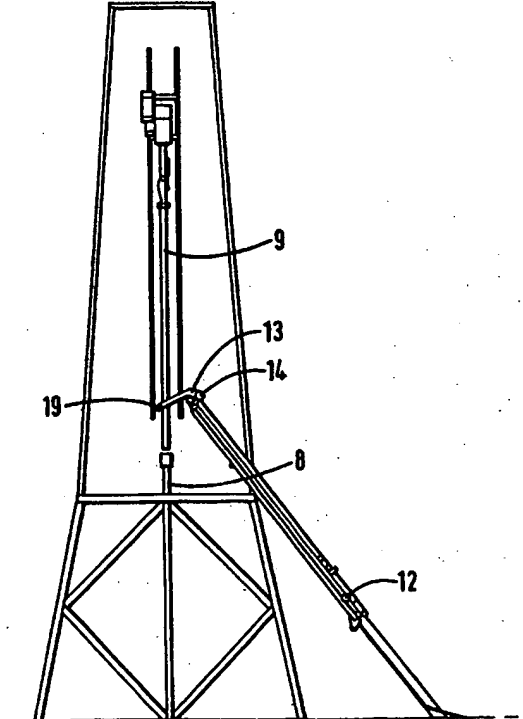


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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : E21B 19/20, 19/15, 19/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 99/41485 (43) International Publication Date: 19 August 1999 (19.08.99)</p>
<p>(21) International Application Number: PCT/GB99/00422 (22) International Filing Date: 11 February 1999 (11.02.99) (30) Priority Data: 9803116.4 14 February 1998 (14.02.98) GB (71) Applicants (for all designated States except US): WEATHER-FORD/LAMB, INC. [US/US]; c/o CSC - The United States Corporation Company, 1013 Centre Road, Wilmington, DE 19805 (US). LUCAS, Brian, Ronald [GB/GB]; Lucas & Co., 135 Westhall Road, Warlingham, Surrey CR6 9HJ (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): PIETRAS, Bernd-Georg [DE/DE]; Sandriedeweg 12, D-30900 Wedemark (DE). (74) Agent: HARDING, Richard, Patrick; Marks & Clerk, 4220 Nash Court, Oxford Business Park South, Oxford OX4 2RU (GB).</p>		<p>(81) Designated States: AU, CA, CN, JP, NO, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</p>
<p>(54) Title: APPARATUS FOR DELIVERING A TUBULAR TO A WELLBORE</p> <p>(57) Abstract</p> <p>An apparatus for delivering a tubular (9) to a well centre, which apparatus comprises means (13, 14) which, in use, inhibit swinging motion of the tubular (9) whilst it is suspended from an elevator.</p> 		

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APPARATUS FOR DELIVERING A TUBULAR TO A WELLBORE

This invention relates to an apparatus for delivering a tubular to a well centre.

During the construction of oil and gas wells a plurality of tubulars are transferred from a storage area to the well centre. Typically, each tubular is transferred to the V-slot adjacent the rig floor by a conveyor. The tubular is then lifted by an elevator and swung into position over the well centre ready for attachment to a string of tubulars extending down the well.

One of the difficulties associated with this process is that as the elevator moves the tubular, the tubular swings back and forth like a giant pendulum. This is potentially very hazardous, particularly when handling tubulars of large diameters.

An aim of at least preferred embodiments of the present invention is to reduce this problem.

According to one aspect of the present invention there is provided an apparatus for delivering a tubular to a well centre, which apparatus comprises means which, in use, inhibit swinging motion of the tubular whilst it is suspended from an elevator.

Preferably, said means comprises an arm which is pivotable between a first position and a second position.

Advantageously, said arm is provided with a stub axle which is provided with rollers for supporting said tubular.

Preferably, the apparatus further comprises a ramp which can be placed against a rig floor, and a tray which can support a tubular and be moved along said ramp.

The ramp may define an angle with the horizontal of between 30 degrees and 70 degrees, but it is normally intended to be used at angles of from 10 to 60 degrees.

In one embodiment, said arm is mounted on said ramp.

In another embodiment, said arm is mounted on said tray.

Alternatively, the arm may be mounted on the derrick.

5 Advantageously, said arm is rotatable about its axis to release said tubular therefrom, for example by an hydraulic motor.

Preferably, the apparatus includes an hydraulic motor to pivot said means.

10

* * *

According to another aspect of the present invention, there is provided an apparatus for delivering a tubular to a well centre, which apparatus comprises a ramp which can be placed against a rig floor, a tray for
15 carrying said tubular and means which, in use, enables said tray to ascend or descend said ramp.

Preferably, said ramp further comprises a rack.

Advantageously, said means is a pinion mounted on said tray and engageable with said rack.

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The means by which the tray moves along the ramp may be of any suitable means, but is preferably a rack and pinion.

Preferably, said means comprises two pinions, one mounted adjacent each end of said tray.

25

Advantageously, said tray further comprises a support wheel.

Preferably, said tray further comprises a pipe sledge mounted for longitudinal movement therein.

30 Advantageously, said tray further comprises a pipe pusher mounted such that, in use, said pipe pusher moves said tubular longitudinally within said tray.

* * *

According to another aspect of the present invention, there is provided an apparatus for delivering
35 a tubular to a well centre, which apparatus comprises a

- 3 -

tray for supporting said tubular, and means which, in use, can apply a force to said tubular to move it longitudinally with respect to said tray.

Preferably, said means comprises a piston and
5 cylinder.

Advantageously, said apparatus further comprises a ramp which can be placed against a rig floor, and a tray which can be moved along said ramp.

For a better understanding of the present invention reference will now be made, by way of example, to the accompanying drawings, in which:-

Fig. 1 is a side view of an apparatus in accordance with the present invention about to deliver a tubular to the well centre of a drilling platform;

Fig. 2 is a side view, to an enlarged scale, of part of the apparatus shown in Fig. 1 with the tubular mounted thereon; and

Figs. 3 to 9 show successive stages in the operation of the apparatus.

Referring to Fig. 1 there is shown an apparatus which is generally identified by reference numeral 1.

The apparatus 1 comprises a ramp 3 which extends upwardly to a rig floor 2 and a pipe tray 4. The ramp 3 extends between the pipe tray 4 and a V-slot (not shown) in a derrick 5. The derrick 5 is provided with an elevator 6 which is supported from a top drive slidably mounted on a track 7.

A tubular 8 is shown within the derrick 5 having been screwed or otherwise attached to a string of tubulars (not shown) which extend down a wellbore (not shown) at the well centre. A tubular 9 is shown resting on the pipe tray 4 and is to be attached to the tubular 8 in the process of increasing the length of the string of tubulars within the wellbore.

Referring now to Fig. 2 the ramp 3 further comprises a rack 10 which extends from the lower end of ramp 3 to the upper end of ramp 3.

The pipe tray 4 further comprises two pinions 11, 12 which can be rotated by respective hydraulic motors (not shown) so that, in use, the pipe tray 4 can move either up or down the rack 10. The pinion 11 is located at one end of the pipe tray 4 whilst the pinion 12 is located at the opposite end of pipe tray 4.

A stabbing arm 13 is pivotally mounted at the end of pipe tray 4 and may be rotated by means of a swivel drive 14. Swivel drive 14 can be actuated by a hydraulic motor (not shown) to move the stabbing arm 13 between a first position shown in Fig. 2 and a second position shown in Fig. 9 as more fully described hereafter. The stabbing arm 13 is provided with a stub axle which carries rollers 19 to facilitate longitudinal movement of the tubular 9.

A pipe sledge 15 resides within and at the rear end of the pipe tray 4. The pipe sledge 15 has rollers 20 mounted at each end so that in use the pipe sledge 15 can move along the longitudinal axis of the pipe tray 4.

A pipe pusher 16 which comprises a piston and cylinder is located substantially in abutment with the pipe sledge 15. The pipe pusher 16 can be hydraulically activated so that the piston of the pipe pusher 16 will exert a force on the pipe sledge 15 to move the tubular 9 longitudinally within the pipe tray 4.

Elastomeric sliding plates 18 are provided along the length of pipe tray 4 and allow the tubular 9 to rest therein. In use, the elastomeric sliding plates 18 are movable within the pipe tray 4 to help support the tubular 9.

A support wheel 17 is located at the rear end of the pipe tray 4 which, in use, allows movement of the pipe tray 4 towards the V-slot in the derrick 5.

Figures 3 to 9 show the apparatus in use.

Prior to using the apparatus 1 the tubular 9 is rolled onto the pipe tray 4 from a pipe deck (not shown). The pinion 11 is rotated. The teeth of the pinion 11 engage the rack 10 moving the pipe tray 4 toward the V-slot (not shown) in the derrick 5, as shown in Fig. 3. The pinion 12 is rotated as it nears the ramp 3 so that upon engagement with the ramp 3 the pipe tray 4 continues to move toward the V-slot in the derrick 5.

As shown in Figs. 4 and 5 the pinion 11 has left the ramp 3 but the pipe tray 4 continues to move toward the V-slot in the derrick 5 under the effect of the pinion 12. The pinions 11, 12 are stopped when the pipe tray 4 has reached the position shown in Fig. 5.

The tubular 9 is pushed out of the pipe tray 4 by extending the piston in the pipe pusher 16. The tubular 9 is pushed to a position where the elevator 6 can be easily attached to the tubular 9 as shown in Fig. 6.

Fig. 7 shows the elevator 6 having lifted the tubular 9 to a position where the lower end of tubular 9 is near the rollers 19 of the stabbing lever 13 and the upper end is substantially above the well centre.

Swivel drive 14 is now engaged to rotate the stabbing lever 13 clockwise between the first position, shown in Fig. 7, and the second position, shown in Fig. 9. Movement of the stabbing lever 14 brings the longitudinal axis of the tubular 9 from an inclined position with respect to the longitudinal axis of the borehole (not shown), to a position which is substantially in alignment with the axis of the borehole (Fig. 9) (well centre). The rollers 19 allow substantially vertical movement of the tubular 9. Once this is completed the stabbing lever 14 is turned through 90° so that the stabbing lever 14 may be returned to its first position. The pipe tray 4 can then return to its initial position by reversal of the pinion drives 11, 12 to collect another tubular so that the process may be repeated.

Claims:-

1. An apparatus (1) for delivering a tubular (9) to a well centre, which apparatus comprises means (13, 14) which, in use, inhibit swinging motion of the tubular (9) whilst it is suspended from an elevator.
2. An apparatus (1) as claimed in Claim 1, wherein said means comprises an arm (13) which is pivotable between a first position and a second position.
3. An apparatus (1) as claimed in Claim 2, wherein said arm (13) is provided with a stub axle which is provided with rollers (19) for supporting said tubular (9).
4. An apparatus (1) as claimed in any preceding Claim, further comprising a ramp (3) which can be placed against a rig floor (2), and a tray (4) which can support a tubular (9) and be moved along said ramp (3).
5. An apparatus (1) as claimed in Claim 4, wherein said arm (13) is mounted on said ramp (3).
6. An apparatus (1) as claimed in Claim 4, wherein said arm (13) is mounted on said tray (4).
7. An apparatus (1) as claimed in any of Claims 7 to 10, wherein said arm (13) is rotatable about its axis to release said tubular (9) therefrom.
8. An apparatus (1) as claimed in any preceding Claim, including an hydraulic motor to pivot said means.
9. An apparatus (1) for delivering a tubular (9) to a well centre, which apparatus comprises a ramp (3) which can be placed against a rig floor (2), a tray (4) for carrying said tubular, (9) and means which, in use, enables said tray (4) to ascend or descend said ramp (3).
10. An apparatus (1) as claimed in Claim 9, wherein said ramp (3) further comprises a rack (10).
11. An apparatus (1) as claimed in Claim 9 or 10, wherein said means is a pinion (11) mounted on said tray (4) and engageable with said rack (10).

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12. An apparatus (1) as claimed in Claim 9 or 10, wherein said means comprises two pinions (11, 12), one mounted adjacent each end of said tray (4).

13. An apparatus (1) as claimed in any preceding Claim, wherein said tray (4) further comprises a support wheel (17).

14. An apparatus as claimed in Claim 13, wherein the tray (4) further comprises a pipe sledge (15) mounted for longitudinal movement therein.

15. An apparatus (1) as claimed in Claim 14, wherein said tray (4) further comprises a pipe pusher (16) mounted such that, in use, the pipe pusher (16) moves said tubular (9) longitudinally within said tray (4).

* * *

16. An apparatus (1) for delivering a tubular to a well centre, which apparatus comprises a tray (4) for supporting said tubular (9), and means which, in use, can apply a force to said tubular (9) to move it longitudinally with respect of said tray (4).

17. An apparatus (1) as claimed in Claim 16, wherein said means comprises a piston and cylinder.

18. An apparatus (1) as claimed in Claim 16 or 17, further comprising a ramp (3) which can be placed against a rig floor, and a tray (4) which can be moved along said ramp (3).

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FIG. 1

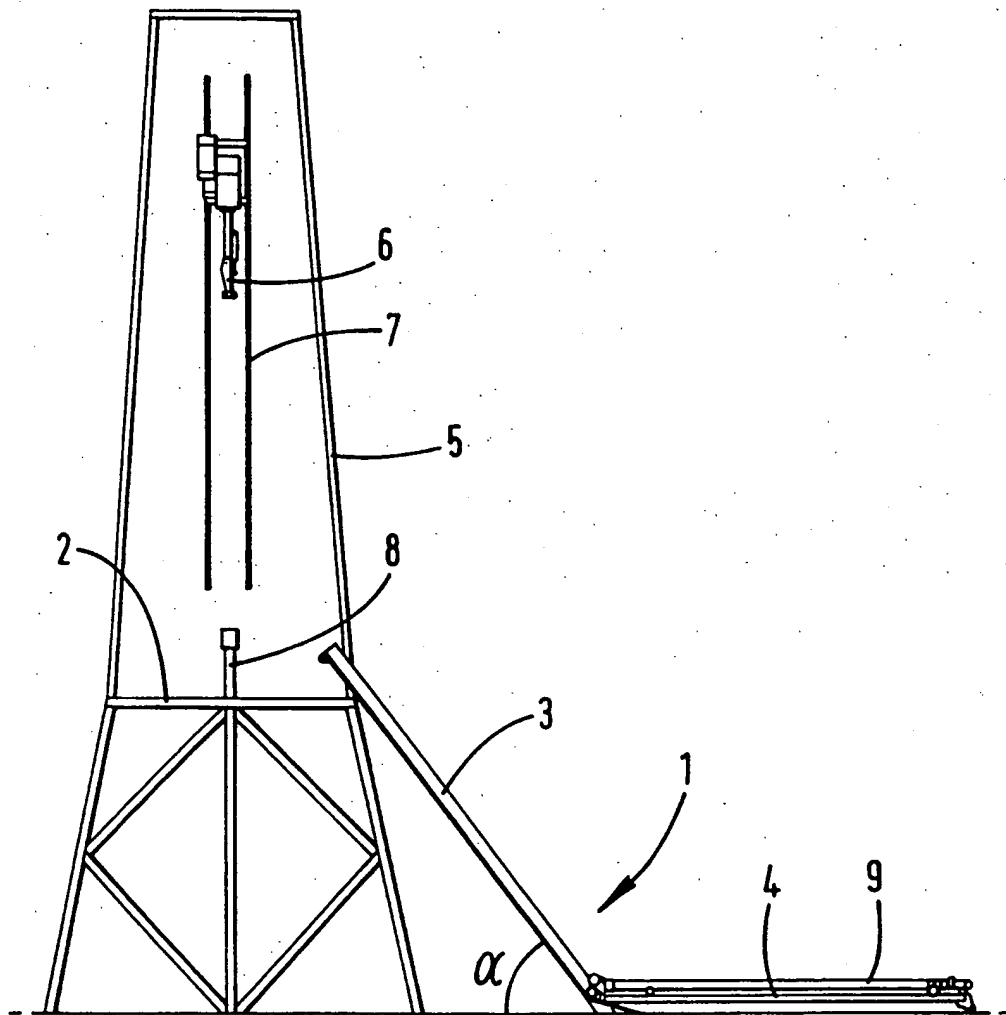


FIG. 2

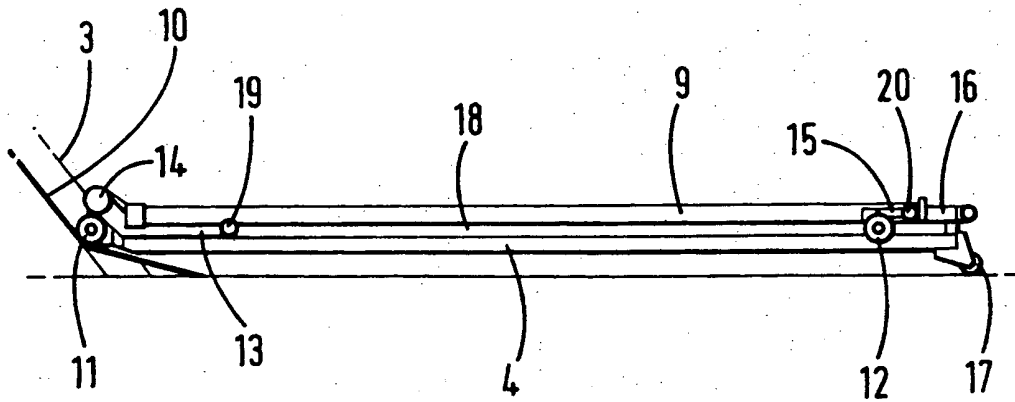
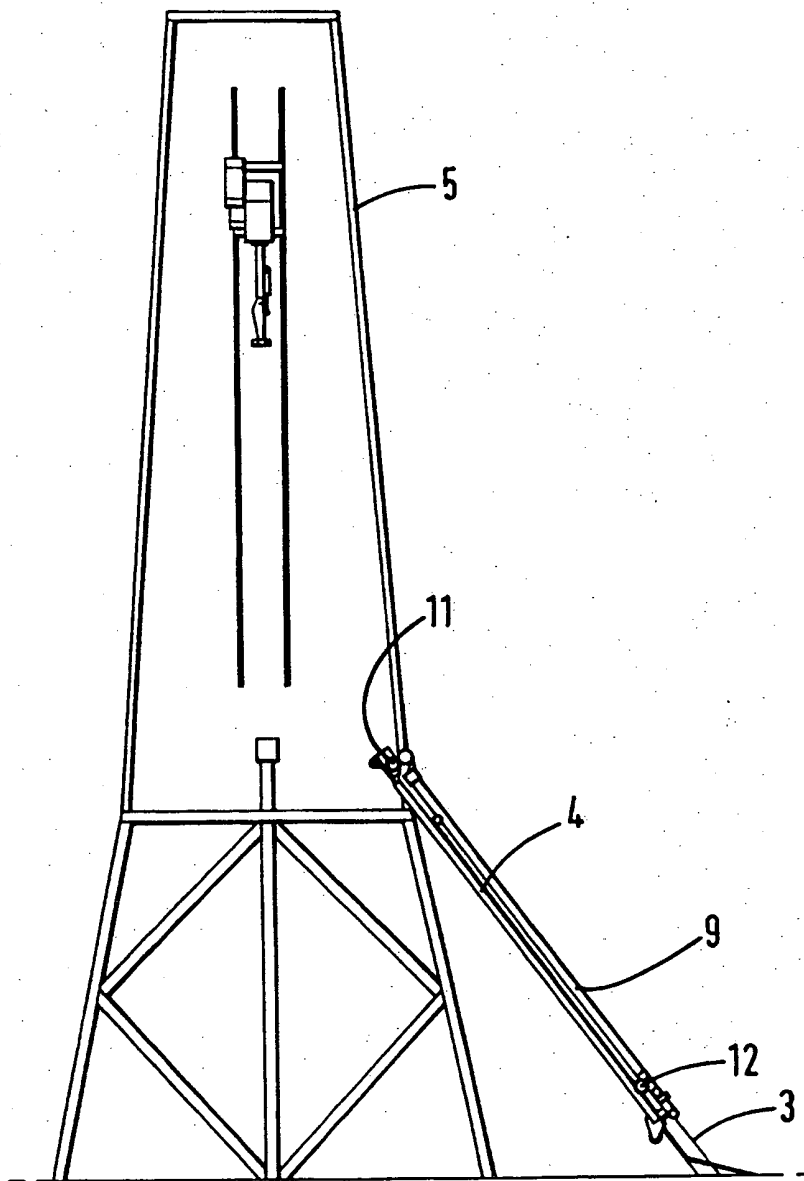
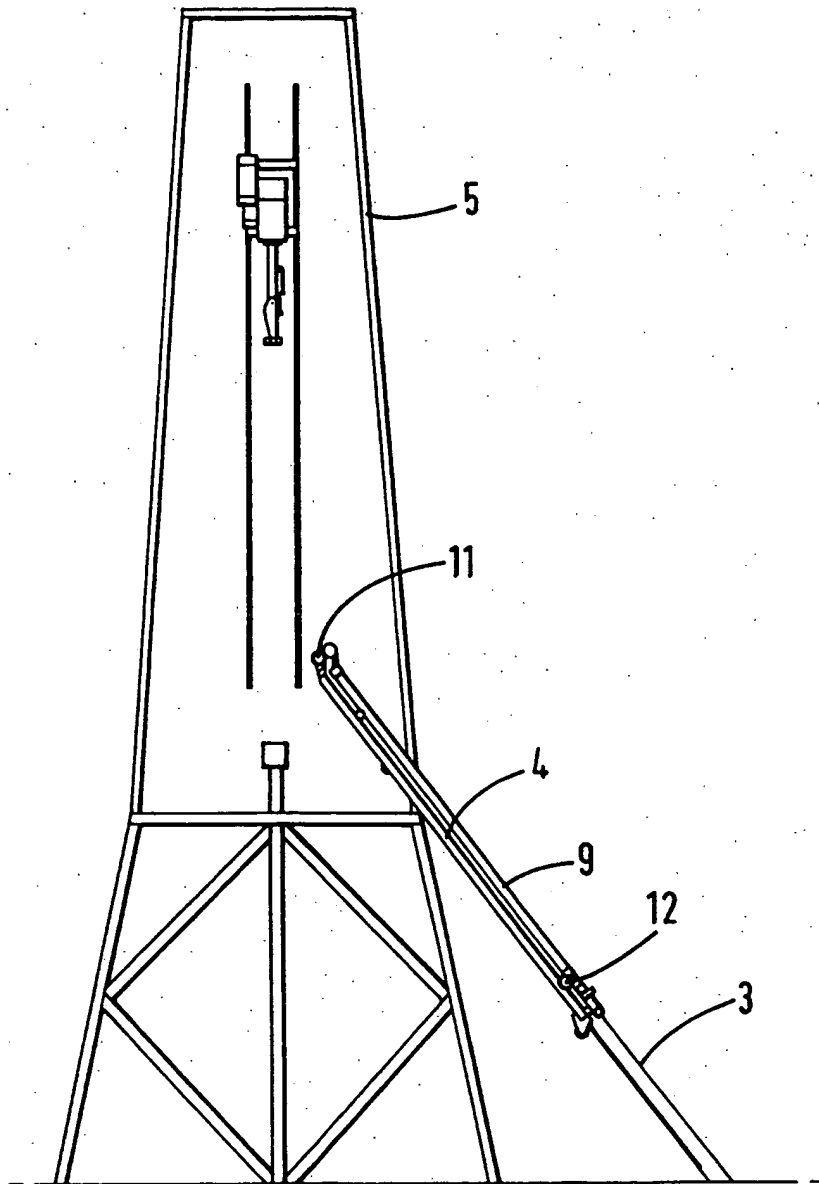


FIG 4



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FIG. 5



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FIG. 6

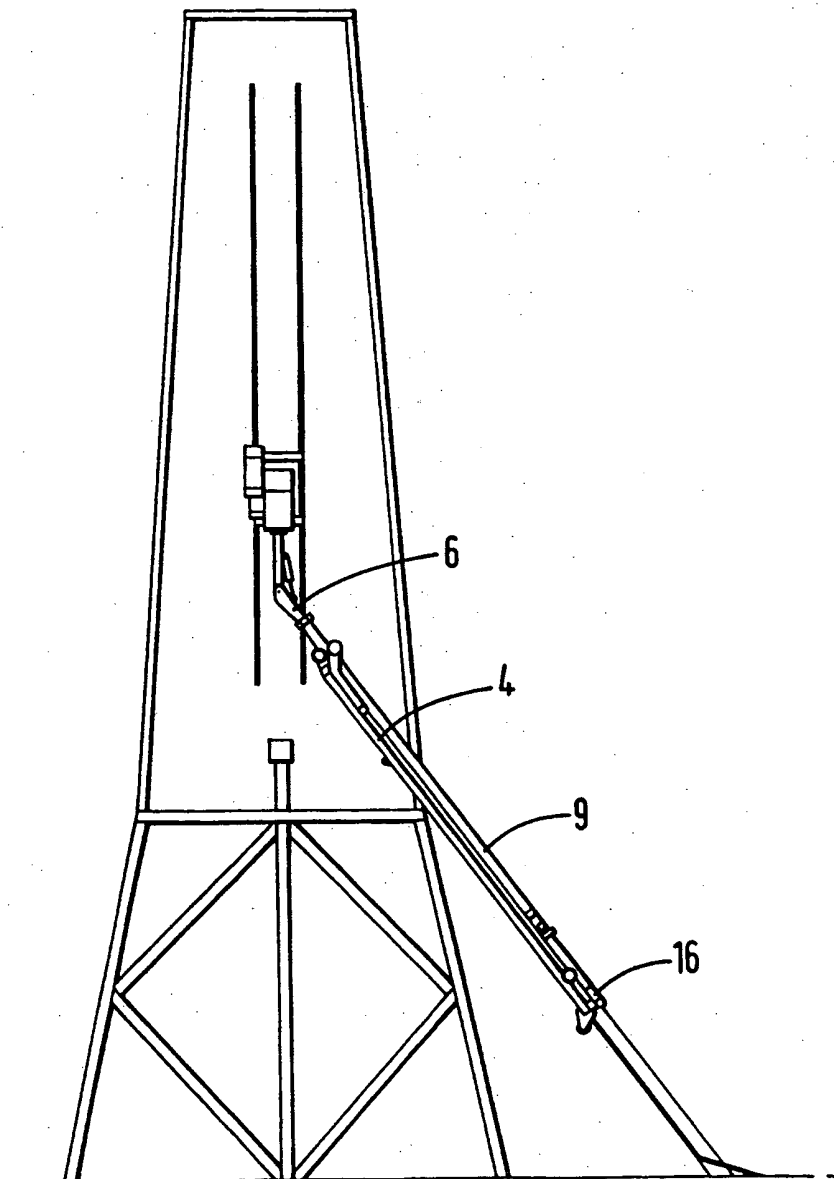


FIG. 7

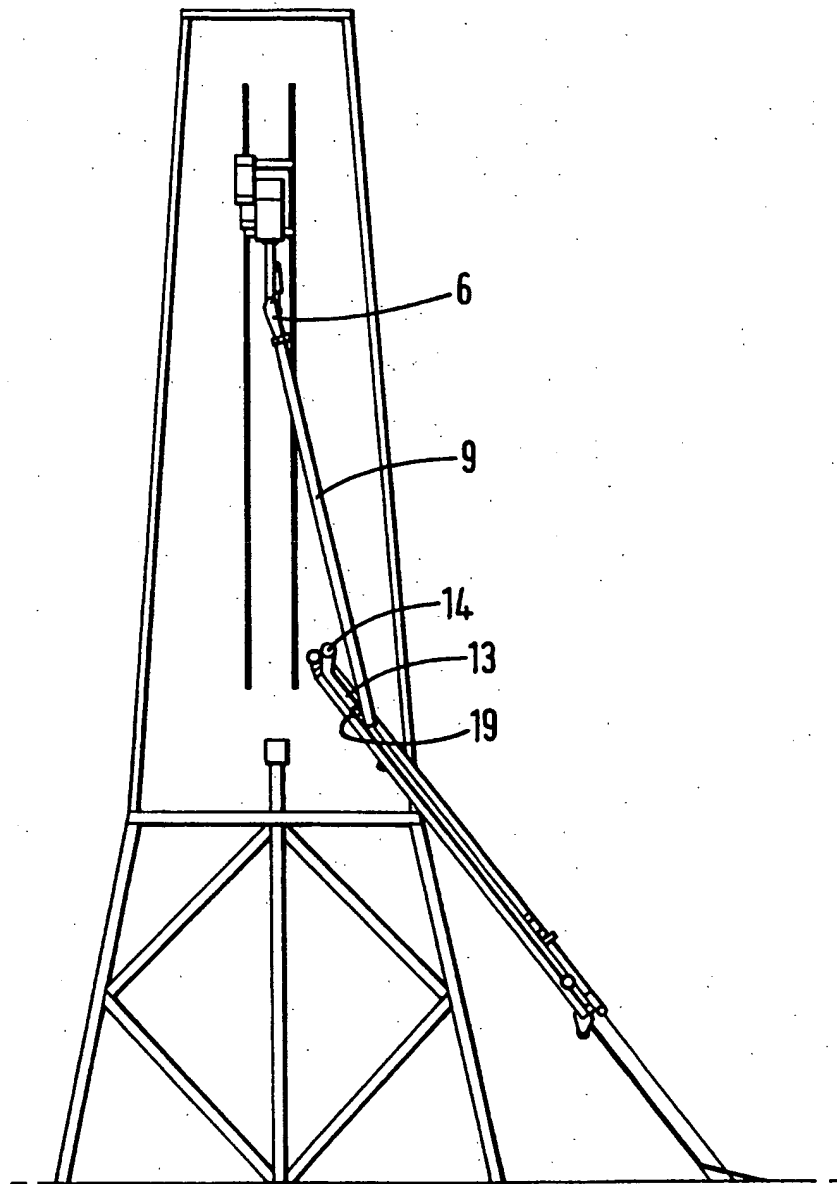


FIG. 8

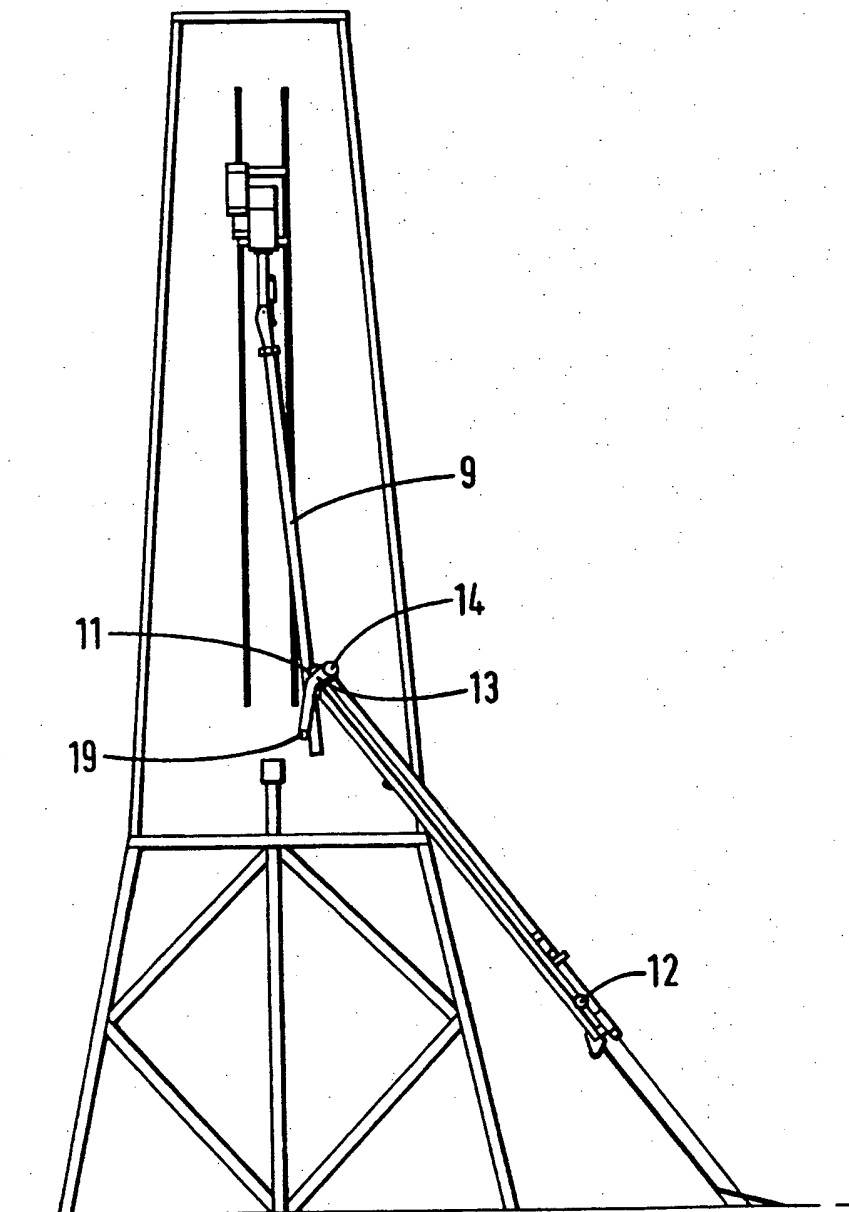
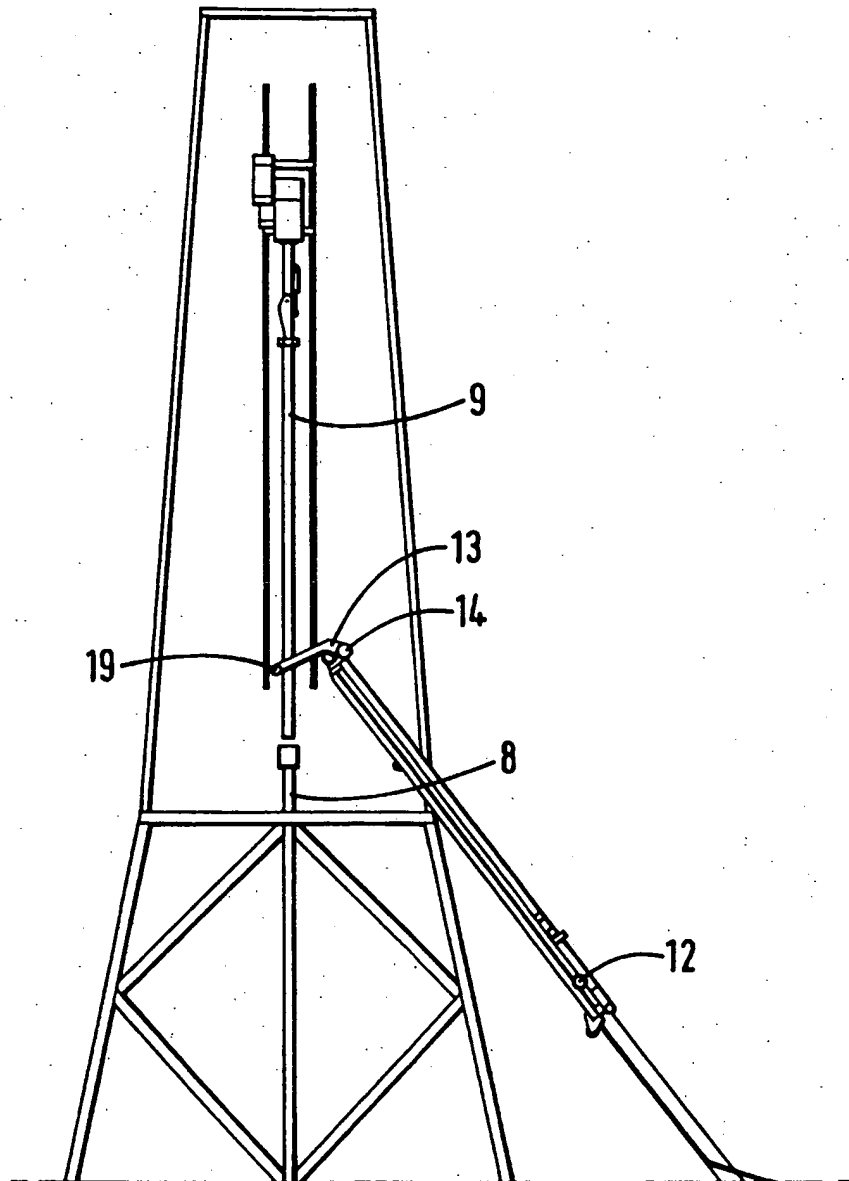


FIG. 9



INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 99/00422

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 E21B19/20 E21B19/15 E21B19/00

According to international Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 625 796 A (BOYADJIEFF GEORGE I) 2 December 1986 (1986-12-02) column 6, line 30-37 column 8, line 24-35 column 10, line 18-26 figures 8-11	1,2
X	US 3 795 326 A (NEILON C ET AL) 5 March 1974 (1974-03-05) column 3, line 3-13 figure 1A	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

3 May 1999

Date of mailing of the international search report

23. 07. 1999

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/GB 99/ 00422

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

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2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-8

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1. Claims: 1-8

An apparatus for delivering a tubular to a well centre with means that inhibit the swinging motion of a tubular whilst it is suspended from an elevator.

2. Claims: 9-16

An apparatus for delivering a tubular to a well centre comprising a ramp and a tray.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 99/00422

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